PERFORMANCE ASSESSMENT OF REFRACTORY CONCRETE USED ON THE SPACE SHUTTLE'S LAUNCH PAD

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ABSTRACT

The John F. Kennedy Space Center (KSC) maintains several facilities for launching space vehicles. During recent launches it has been observed that the refractory concrete materials that protect the steel-framed flame duct are breaking away from this base structure and are being projected at high velocities. There is significant concern that these projected pieces can strike the launch complex or space vehicle during the launch, jeopardizing the safety of the mission. A qualification program is in place to evaluate the performance of different refractory concretes and data from these tests have been used to assess the performance of the refractory concretes. However, there is significant variation in the test results, possibly making the existing qualification test program unreliable. This paper will evaluate data from past qualification tests, identify potential key performance indicators for the launch complex, and will recommend a new qualification test program that can be used to better qualify refractory concrete.

Key words: refractory concrete, performance, coefficient of thermal expansion, shrinkage, modulus of rupture, abrasion/erosion.